

**REMARKS**

The Office Action mailed July 27, 2005, has been received and reviewed. Claims 1 through 41 were pending in the application, of which claims 1 through 24 and 41 are currently under examination. Claims 25 through 40 are cancelled, without prejudice, from consideration as being drawn to a non-elected invention. Applicant herein acknowledges the restriction requirement in the above-referenced application, and affirm the election to prosecute the claims of Group I, claims 1 through 24 and 41, without further traverse. Claims 1 through 24 and 41 stand rejected. Applicant has amended claims 1, 16 and 41, and respectfully request reconsideration of the application as amended herein.

**35 U.S.C. § 112 Claim Rejections**

Claim 1 stands rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Applicants have amended claim 1 to remove a typographical error and request the rejection be withdrawn.

**35 U.S.C. § 103(a) Obviousness Rejections**

Obviousness Rejection Based on U.S. Publication No. 2002/0139665 to DeOrnellas et al. in view of U.S. Patent No. 4,585,516 to Corn et al.

Claims 1 and 2 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over DeOrnellas et al. (U.S. Publication No. 2002/0139665) in view of Corn et al. (U.S. Patent No. 4,585,516). Applicant respectfully traverses this rejection, as hereinafter set forth.

M.P.E.P. 706.02(j) sets forth the standard for a Section 103(a) rejection:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, **the prior art reference (or references when combined) must teach or suggest all the claim limitations.** The teaching or suggestion to make the claimed combination and the reasonable

expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). (Emphasis added).

The 35 U.S.C. § 103(a) obviousness rejections of claims 1-24 and 41 are improper because the elements for a prima facie case of obviousness are not met. Specifically, the rejection fails to meet the criterion that the prior art reference must teach or suggest all the claims limitations.

Claims 1 and 2

Applicants' presently amended independent claim 1 recites:

1. A plasma reactor, comprising:  
*one or more of first, second and third power generators coupled to each one of upper and lower electrodes; and*  
a controller for selectively activating the first, second and third power generators. (Emphasis added.)

The Office Action alleges:

Regarding Claim 1: DeOrnelas et al teach a plasma apparatus (Figure 1), comprising upper electrode 26, lower electrode 28 and power generators 30, 32, 34 coupled to upper and lower electrodes. (Paragraphs 0023, 0024).

DeOrnelas et al do not teach controller.

Corn et al teach an apparatus (Figure 1) that has a control means (controller ) 27 for controlling the signals applied to the reactor to improve etching capability of the apparatus (Column 2, lines 45-55 and Column 1, lines 36-38). Corn et al further teach that the apparatus uses at least two (implying there could be three sources) sources of RF power (Column 1, lines 42-45). (Office Action, p. 4).

Applicants respectfully disagree that the cited references teach or suggest all of the claimed elements of Applicants' invention as presently claimed. Applicants interpret the statement in the Office Action referring to "upper electrode 26" as being a typographical error which in fact should read "upper electrode 24". Accordingly, Applicants' discussion will assume "upper electrode 24" rather than "the DeOrnelas publication reference's "side peripheral electrode 26".

The DeOrnelas publication reference teaches of a "bottom electrode 28", a "side peripheral electrode 26" and an "upward electrode 24" (paragraph [0023]). The DeOrnelas

publication reference further teaches that “the side peripheral electrode 26 is connected to a power supply 30 which provides power to the side peripheral electrode 26” (paragraph [0023]). The DeOrnelas publication reference further teaches that “[a] second power supply 32 is connected to the bottom electrode 28” (paragraph [0024]). Additionally, the DeOrnelas publication reference is very clear regarding the configuration of the “upward electrode”, namely, that the “**upward electrode**” is “**a grounded upward electrode 24**” (paragraphs [0023], [0027]). The DeOrnelas publication reference is clear that no power supply or power generator is connected to the “upward electrode.”

The Office Action introduces the Corn reference to teach control of the power generators.

Applicants respectfully submit that any proposed combination of the DeOrnelas publication reference and the Corn reference does not teach or suggest the claim limitations calling for “one or more of first, second and third power generators coupled to each one of upper and lower electrodes; and a controller for selectively activating the first, second and third power generators”, as claimed by Applicants. Accordingly, since the DeOrnelas publication reference and the Corn reference, either individually or in any proper combination, do not teach or suggest Applicants’ invention as presently claimed in amended independent claim 1 and claim 2 depending therefrom, such cited reference can not render obvious under 35 U.S.C. §103 Applicants’ invention as presently claimed.

Therefore, Applicants respectfully request the rejection of claims 1 and 2 be withdrawn.

Obviousness Rejection Based on U.S. Patent No. 6,043,607 to Roderick in view of U.S. Patent No. 6,492,280 to DeOrnelas et al.

Claims 1 through 3, and 9 through 11 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Roderick (U.S. Patent No. 6,043,607) in view of DeOrnelas et al. (U.S. Patent No. 6,492,280). Applicant respectfully traverses this rejection, as hereinafter set forth.

M.P.E.P. 706.02(j) sets forth the standard for a Section 103(a) rejection:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must

be a reasonable expectation of success. Finally, **the prior art reference (or references when combined) must teach or suggest all the claim limitations.** The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). (Emphasis added).

The 35 U.S.C. § 103(a) obviousness rejections of claims 1 through 3, and 9 through 11 are improper because the elements for a *prima facie* case of obviousness are not met. Specifically, the rejection fails to meet the criterion that the prior art reference must teach or suggest all the claims limitations.

Claims 1-3 and 9-11

Applicants' presently amended independent claim 1 recites:

1. A plasma reactor, comprising:  
*one or more of first, second and third power generators coupled to each one of upper and lower electrodes; and*  
a controller for selectively activating the first, second and third power generators. (Emphasis added.)

The Office Action alleges:

Regarding Claims 1, 2: Roderick teaches an apparatus (Figures 1-3) that comprises first, second, third generators 118.sub.1, 118.sub.2, 118.sub.3 coupled to upper and lower electrodes 126, 114 and a controller (feedback control device) 300 (Column 3, lines 1-20). Roderick further teaches that the feedback control device (controller) 300 provides dynamic control of signal characteristics of the three signals (column 4, lines 12-50).

Roderick does not specifically teach the electrodes to which the generators are coupled.

DeOrnellas et al teach an apparatus (Figure 6) that has generators 48, 50 coupled to lower electrode 42 for obtaining wafer etching with straight vertical sidewall profiles. (Office Action, p. 5)

Applicants respectfully disagree that the cited references teach or suggest all of the claimed elements of Applicants' invention as presently claimed. The Roderick reference teaches "a plurality of sinusoidal signal generators 118n (n is an integer greater than 1) and a summer 120" (col. 3, lines 16-18) *forming "a complex waveform generator 102* coupled to a power amplifier 104" (col. 2, lines 60-61) and the "complex waveforms(s) (e.g., selected frequency

bands) are *coupled to the cathode and anode electrodes 114 and 126* or, optionally, to an antenna 116" (col. 3, lines 5-7).

Specifically, the Roderick reference may use multiple "signal generators" to for one "waveform generator", however, *only one waveform generator is coupled to an electrode*.

The Office Action introduces the DeOrnellas patent reference to teach "generators 48, 50 coupled to lower electrode 42" (Office Action, p. 5).

Applicants respectfully submit that any proposed combination of the Roderick reference and the DeOrnellas patent reference does not teach or suggest the claim limitations calling for "one or more of first, second and third power generators coupled to each one of upper and lower electrodes; and a controller for selectively activating the first, second and third power generators", as claimed by Applicants. Accordingly, since the Roderick reference and the DeOrnellas patent reference, either individually or in any proper combination, do not teach or suggest Applicants' invention as presently claimed in amended independent claim 1 and claims 2, 3, 9-11 at least indirectly depending therefrom, such cited reference can not render obvious under 35 U.S.C. §103 Applicants' invention as presently claimed.

Therefore, Applicants respectfully request the rejection of claims 1 through 3, and 9 through 11 be withdrawn.

Obviousness Rejection Based on U.S. Patent No. 5,656,123 to Salimian et al. in view of U.S. Patent No. 6,492,280 to DeOrnellas et al.

Claims 1 2, 4, and 12 through 23 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Salimian et al. (U.S. Patent No. 5,656,123) in view of DeOrnellas et al. (U.S. Patent No. 6,492,280). Applicant respectfully traverses this rejection, as hereinafter set forth.

M.P.E.P. 706.02(j) sets forth the standard for a Section 103(a) rejection:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, **the prior art reference (or references when combined) must teach or suggest all the claim limitations**. The teaching or suggestion to make the claimed combination and the reasonable

expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). (Emphasis added).

The 35 U.S.C. § 103(a) obviousness rejections of claims 1 2, 4, and 12 through 23 are improper because the elements for a prima facie case of obviousness are not met. Specifically, the rejection fails to meet the criterion that the prior art reference must teach or suggest all the claims limitations.

Claims 1, 4, and 12-23

Applicants' presently amended independent claim 1 recites:

1. A plasma reactor, comprising:  
*one or more of first, second and third power generators coupled to each one of upper and lower electrodes; and*  
a controller for selectively activating the first, second and third power generators. (Emphasis added.)

Applicants' presently amended independent claim 16 recites:

16. A plasma reactor, comprising:  
a vacuum chamber including upper and lower electrodes therein;  
*one or more of first, second and third power generators respectively operably coupled to each one of upper and lower electrodes; and*  
a controller for selectively activating the first, second and third power generators. (Emphasis added.)

The Office Action alleges:

Regarding Claims 1, 2, 16: Salimian et al teach an apparatus (Figure 1) that comprises a vacuum chamber 14, generators 12, 16 coupled to upper and lower electrodes 20, 22 (column 5, lines 35-55).

Salimina et al do not teach third power supply and controller.

DeOrnellas et al teach an apparatus (Figure 6) that has generators 48, 50 coupled to lower electrode 42 and a controller 54 for obtaining wafer etching with straight vertical sidewall profiles. (Office Action, p. 6)

Applicants respectfully disagree that the cited references teach or suggest all of the claimed elements of Applicants' invention as presently claimed. The Salimian reference teaches "a 60 MHz RF signal from 60 MHz RF generator 12" which travels through a matchbox and is

impedance matched to an “upper electrode 20” (col. 6, lines 19-28). The Salimian reference is entirely silent regarding any control of a generator coupled to an upper electrode.

The DeOrnalles patent reference teaches “upper electrode 46 are grounded as shown” (col 4, lines 63-64) with “[p]referably two power supplies, first power supply 48 and second power supply 50, are connected to the bottom electrode 42” (col. 4, .lines 65-67) and “[f]urther, a controller 54 controls the sequencing of the first and second AC power supplies 48, 50” (col. 5, lines 1-3).

Clearly the “controller” as taught in the DeOrnalles patent reference is configured to sequence power supplies on a common electrode, namely the bottom electrode. Any controlling of generators on the upper and lower electrodes is wholly absent from the combination of the cited references.

Applicants respectfully submit that any proposed combination of the Salimian reference and the DeOrnalles patent reference does not teach or suggest the claim limitations calling for “one or more of first, second and third power generators . . . coupled to each one of upper and lower electrodes; and a controller for selectively activating the first, second and third power generators”, as claimed by Applicants. Accordingly, since the Salimian reference and the DeOrnalles patent reference, either individually or in any proper combination, do not teach or suggest Applicants’ invention as presently claimed in amended independent claims 1 and 16 and claims 2, 4, 12-15 and 17- 23 at least respectively indirectly depending therefrom. Accordingly, such cited references can not render obvious under 35 U.S.C. §103 Applicants’ invention as presently claimed.

Therefore, Applicants respectfully request the rejection of claims 1 2, 4, and 12 through 23 be withdrawn.

Obviousness Rejection Based on U.S. Publication No. 2002/0139665 to DeOrnalles et al. in view of U.S. Patent No. 4,585,516 to Corn et al. as applied to claims 1, 2 and further in view of U.S. Patent No. 5,716,534 to Tsuchiya et al.

Claims 1, 2, 5 through 11, and 41 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over DeOrnalles et al. (U.S. Publication No. 2002/0139665) in view of Corn et al.

(U.S. Patent No. 4,585,516) as applied to claims 1, 2 and further in view of Tsuchiya et al. (U.S. Patent No. 5,716,534). Applicant respectfully traverses this rejection, as hereinafter set forth.

M.P.E.P. 706.02(j) sets forth the standard for a Section 103(a) rejection:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, **the prior art reference (or references when combined) must teach or suggest all the claim limitations.** The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). (Emphasis added).

The 35 U.S.C. § 103(a) obviousness rejections of claims 1, 2, 5 through 11, and 41 are improper because the elements for a *prima facie* case of obviousness are not met. Specifically, the rejection fails to meet the criterion that the prior art reference must teach or suggest all the claims limitations.

Claims 1, 2, 5 through 11, and 41

Applicants' presently amended independent claim 1 recites:

1. A plasma reactor, comprising:  
*one or more of first, second and third power generators coupled to each one of upper and lower electrodes; and*  
a controller for selectively activating the first, second and third power generators. (Emphasis added.)

Applicants' presently amended independent claim 41 recites:

41. A plasma reactor, comprising:  
*one or more of first, second and third power generators each operably coupled to each one of upper and lower electrodes; and*  
a controller operably coupled to each of the first, second and third power generators, the controller further configured to selectively activate the first, second and third power generators in accordance with a variable duty cycle including at least first and second phases.  
(Emphasis added.)

The Office Action alleges:

Regarding Claim 1: DeOrnellas et al teach a plasma apparatus (Figure 1), comprising upper electrode 26, lower electrode 28 and power generators 30, 32, 34 coupled to upper and lower electrodes. (Paragraphs 0023, 0024).

DeOrnellas et al do not teach controller.

Corn et al teach an apparatus (Figure 1) that has a control means (controller ) 27 for controlling the signals applied to the reactor to improve etching capability of the apparatus (Column 2, lines 45-55 and Column 1, lines 36-38). Corn et al further teach that the apparatus uses at least two (implying there could be three sources) sources of RF power (Column 1, lines 42-45). (Office Action, p. 8).

Regarding Claim 41: Tsuchiya et al teach an apparatus (Figures 1, 30-33) that uses CPU (controller) 20 to control power supplies 18, 29 for ON/OFF (active/inactive) modes to optimize the etching parameters (column 9, lines 1-15 and column 12, lines 45-65 and column 13, lines 1-25). Tsuchiya et al further teach that etching parameters can be optimized by appropriately selecting the phase difference and the power ratio of the generators (column 8, lines 20-25). (Office Action, p. 9)

#### Claims 1, 2 and 5-11

Applicants respectfully disagree that the cited references teach or suggest all of the claimed elements of Applicants' invention as presently claimed. Applicants interpret the statement in the Office Action referring to "upper electrode 26" as being a typographical error which in fact should read "upper electrode 24". Accordingly, Applicants' discussion will assume "upper electrode 24" rather than "the DeOrnellas publication reference's "side peripheral electrode 26".

The DeOrnellas publication reference teaches of a "bottom electrode 28", a "side peripheral electrode 26" and an "upward electrode 24" (paragraph [0023]). The DeOrnellas publication reference further teaches that "the side peripheral electrode 26 is connected to a power supply 30 which provides power to the side peripheral electrode 26" (paragraph [0023]). The DeOrnellas publication reference further teaches that "[a] second power supply 32 is connected to the bottom electrode 28" (paragraph [0024]). Additionally, the DeOrnellas publication reference is very clear regarding the configuration of the "upward electrode", namely,

that the “**upward electrode**” is “**a grounded upward electrode 24**” (paragraphs [0023], [0027]). The DeOrnelas publication reference is clear that no power supply or power generator is connected to the “upward electrode.”

The Office Action introduces the Corn reference to teach control of the power generators.

Applicants respectfully submit that any proposed combination of the DeOrnelas publication reference and the Corn reference does not teach or suggest the claim limitations calling for “one or more of first, second and third power generators coupled to each one of upper and lower electrodes; and a controller for selectively activating the first, second and third power generators”, as claimed by Applicants. Accordingly, since the DeOrnelas publication reference and the Corn reference, either individually or in any proper combination, do not teach or suggest Applicants’ invention as presently claimed in amended independent claim 1 and claims 2, 5-11 at least indirectly depending therefrom, such cited references can not render obvious under 35 U.S.C. §103 Applicants’ invention as presently claimed.

Therefore, Applicants respectfully request the rejection of claims 1, 2 and 5-11 be withdrawn.

Claim 41

Applicants respectfully disagree that the cited references teach or suggest all of the claimed elements of Applicants’ invention as presently claimed. Applicants sustain the above-proffered arguments regarding the lack of teaching or suggestion relating to

“one or more of first, second and third power generators each operably coupled to each one of upper and lower electrodes” as claimed by Applicants in presently amended independent claim 41. Even if the Tsuchiya reference teaches or suggests the elements as alleged in the Application, combined elements do not teach or suggest all of the claim limitations as recited in Applicants’ invention as recited in presently amended independent claim 41.

Applicants respectfully submit that any proposed combination of the Tsuchiya reference in combination with the DeOrnelas publication reference and the Corn reference does not teach or suggest the claim limitations calling for “**one or more of first, second and third power generators each operably coupled to each one of upper and lower electrodes**; and

a controller operably coupled to each of the first, second and third power generators, the controller further configured to selectively activate the first, second and third power generators in accordance with a variable duty cycle including at least first and second phases" as presently claimed by Applicants. Accordingly, since the Tsuchiya referend and the DeOrnellas publication reference and the Corn reference, either individually or in any proper combination, do not teach or suggest Applicants' invention as presently claimed in amended independent claim 41, such cited references can not render obvious under 35 U.S.C. §103 Applicants' invention as presently claimed.

Therefore, Applicants respectfully request the rejection of claim 41 be withdrawn.

Obviousness Rejection Based on U.S. Patent No. 5,656,123 to Salimian et al. in view of U.S. Patent No. 6,492,280 to DeOrnellas et al. as applied to claim 16 and further in view of U.S. Patent No. 6,043,607 to Roderick

Claim 24 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Salimian et al. (U.S. Patent No. 5,656,123) in view of DeOrnellas et al. (U.S. Patent No. 6,492,280) as applied to claim 16 and further in view of Roderick (U.S. Patent No. 6,043,607). Applicant respectfully traverses this rejection, as hereinafter set forth.

The nonobviousness of independent claim 16 precludes a rejection of claim 24 which depends therefrom because a dependent claim is obvious only if the independent claim from which it depends is obvious. *See In re Fine*, 5 U.S.P.Q.2d 1596, 1600 (Fed. Cir. 1988), *see also* MPEP § 2143.03. Therefore, the Applicants request that the Examiner withdraw the 35 U.S.C. § 103(a) obviousness rejection to independent claim 16 and claim 24 which depends therefrom.

### CONCLUSION

Claims 1 through 24 and 41 are believed to be in condition for allowance, and an early notice thereof is respectfully solicited. Should the Examiner determine that additional issues remain which might be resolved by a telephone conference, the Examiner is respectfully invited to contact Applicant's undersigned attorney.

Respectfully submitted,



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